

REMARKS

Claims 13-32 are pending in the application. Claims 1-12 were canceled by way of the Preliminary Amendment dated January 24, 2002. Claim 13 has been amended to indicate that the hydrocarbon resin is prepared by copolymerizing phenol in the presence of strong acids or catalysts with one or more unsaturated hydrocarbons selected from butene, butadiene, pentene, piperylene, isoprene, cyclopentadiene, styrene, α -methylstyrene, vinyltoluene, dicyclopentadiene, methyl-dicyclopentadiene, indene and methylindene. Support for the amendment can be found at page 8, lines 1-8 of the specification. Applicants appreciate the Examiner entering the Response after Final dated September 3, 2004.

Rejections under 35 U.S.C. § 103(a)

Claims 13-32 stand rejected under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 6,060,574 to Schmalstieg et al. (hereinafter "Schmalstieg") in view of U.S. Patent No. 4,001,232 to Groegler et. al. (hereinafter "Groegler").

MPEP § 706.02(1) states that subject matter which is prior art under 35 U.S.C. § 103 via 35 U.S.C. § 102 (e) is disqualified as prior art against the claimed invention if that subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person. Applicant is required to make a statement that the common ownership existed at the time the invention was made. Such a statement appears on the following page of this Response.

As Schmalstieg is now disqualified as prior art against the claimed invention, the rejection of Claims 13-32 under 35 U.S.C. § 103(a) should be withdrawn.

STATEMENT OF COMMON OWNERSHIP

The present application, Ser. No. 10/048,086 and U.S. Patent No. 6,060,574 to Schmalstieg et al. were, at the time the invention of the present application was made, owned by Bayer Aktiengesellschaft.

Claims 13-32 stand rejected under 35 U.S.C. § 103(a) as being obvious over U.S. Patent Nos. 4,753,826 to Lauman (hereinafter "Lauman") and 6,153,709 to Xiao et al. (hereinafter "Xiao") in view of Schmalstieg, JP 50-117771, and U.S. Patent Nos. 4,908,408 to Boutillier et. al. (hereinafter "Boutillier") and 6,486,256 to

Tarbutton et al. (hereinafter "Tarbutton"). The Examiner alleges that it would have been obvious to block the polyisocyanates of Lauman and Xiao with the phenol containing hydrocarbon resins of Schmalsteig and Boutillier and that it would have been obvious to use the 2,3-dimethyl-3,4,5,6-tetrahydropyrimidine of JP 50-117771 and Tarbutton as the catalyst of Lauman and Xiao in order to optimize the reaction rate and/or temperature and to improve the load durability and impact resistance. Applicants respectfully request reconsideration.

The present invention is directed to a solventless reactive system, which is curable at room temperature. The system includes

- A) a polyisocyanate that contains at least one organic polyisocyanate having a molecular weight of 168 to 25,000 where at least 95 mole % of the NCO groups are reversibly blocked with at least one hydrocarbon resin containing phenolic OH groups and having a hydroxyl group content of 0.1% to 10.0%, where the hydrocarbon resin is prepared by copolymerizing phenol in the presence of strong acids or catalysts with one or more unsaturated hydrocarbons selected from butene, butadiene, pentene, piperylene, isoprene, cyclopentadiene, styrene, α -methylstyrene, vinyltoluene, dicyclopentadiene, methyldicyclopentadiene, indene and methylindene,
- B) at least one organic amine having at least 2 primary amino groups,
- C) an oxirane compound containing more than one epoxy group per molecule and
- D) a catalyst comprising 2,3-dimethyl-3,4,5,6-tetrahydropyrimidine.

Lauman discloses an abrasion resistant polymer and coating composition comprising a liquid epoxy resin, a blocked isocyanate prepolymer, a rheological additive, a curing agent, a plasticizer, and a silane.

Xiao discloses a formulation for covering vehicle panels with a chip resistant, vibration damping coating. The formulation includes a blocked polyurethane prepolymer (or a blocked polyisocyanate and a polyol), an epoxy resin, a filler and a plasticizer.

Boutillier discloses a composition for a cross-linkable hot melt adhesive formed by an ethylene-vinyl acetate copolymer containing primary hydroxyl functions and a blocked polyisocyanate. This composition when associated with a tackifying

resin, which can also serve as blocking agent of the polyisocyanate, is a cross-linkable hot melt adhesive. The adhesive is used at a temperature at least equal to the splitting temperature of the isocyanate functionality of the polyisocyanate.

Tarbutton discloses a two-part composition useful as an adhesive that includes an epoxy resin, a chain extender selected from an amine or a phenolic compound, a base catalyst and a polymeric toughener wherein Part A contains the catalyst and Part B contains the epoxy resin.

JP 50-117771 discloses the preparation of oxazolidone or polyoxazolidones from epoxy compounds and organic isocyanates using cycloamidines as catalysts.

As indicated above, Schmalstieg is disqualified as prior art against the claimed invention under 35 U.S.C. § 103(a).

Boutillier discloses using a blocking agent that is a terpene-phenolic tackifying resin having free phenolic functions (col. 2, lines 50-53).

The present claims have been amended to require that the blocking agent be a hydrocarbon resin prepared by copolymerizing phenol in the presence of strong acids or catalysts with one or more unsaturated hydrocarbons selected from butene, butadiene, pentene, piperylene, isoprene, cyclopentadiene, styrene, α -methylstyrene, vinyltoluene, dicyclopentadiene, methyldicyclopentadiene, indene and methylindene. The blocking agents in the presently amended claims are not terpene-phenolic tackifying resins as required in Boutillier.

Further, there is no disclosure or suggestion in Boutillier to use the blocking agents of the presently amended claims. Boutillier discloses hot melt adhesives that cure at 200 to 220°C, not ambient cure systems as in the present claims.

Additionally, there is no disclosure in any of Lauman, Xiao, Tarbutton or JP 50-117771 that suggest or would in any way motivate one skilled in the art to use the presently claimed blocking agents.

The problem that the present invention looks to solve involves utilizing polyisocyanates to crosslink or network oxirane containing resins that have been cured with hydroxyl and/or amine functional compounds. Hydroxyl functionality is introduced, for example, through the opening of the oxirane ring. The polyisocyanate cannot be added after the epoxy system has cured, because the cured system is a solid and the polyisocyanate does not have sufficient opportunity

to mix into the cured system. Thus, the polyisocyanate is added to the mixture of epoxy and hydroxyl and/or amine containing compounds. If the added polyisocyanate is unblocked, a violent exothermic reaction results, so blocked isocyanates are used.

Particular problems in using blocked isocyanates result from unblocking the polyisocyanate. The epoxy cure reaction takes place at ambient conditions, and many blocking agents require elevated temperatures unblock from the isocyanate and react. Thus, in many cases, blocked isocyanates are not sufficiently unblocked and reacted at ambient temperatures to effect the desired crosslinking or network structure.

Not all blocking agents lead to the same results in terms of reactivity or equilibrium between blocked polyisocyanates on one side and the mix of polyisocyanates and blocking agent on the other. Some blocked polyisocyanates are so stable that it takes high temperatures to unblock them, and once they are unblocked, they rapidly react with whatever hydroxyl or amine is present especially because the temperature is so high at that moment. Such high temperatures are not feasible in the present situation because one cannot put a supertanker into a stove (ballast tank applications) or heat up a floor that is to be coated.

The particular blocking agents used in the present invention actually exist in an equilibrium-type of relationship with the isocyanate groups in the polyisocyanates. Thus, at all times, a small portion of the isocyanate groups are unblocked and available for reaction with amine and hydroxyl groups at ambient conditions.

As the epoxy cure reaction proceeds, some of the amine and/or hydroxyl groups react with the available isocyanate groups. The removal of these groups from the equilibrium relationship shifts the equilibrium so that more free isocyanate groups are generated. In this way, free isocyanate groups are generated throughout the epoxy curing process so that both epoxy cure and network structure development take place simultaneously.

The object of the invention was therefore to provide reactive systems curable at room temperature, based on blocked polyisocyanates, polyamines and compounds with oxirane groups.

The desirable situation is one where the reaction rates of epoxy cure and isocyanate reaction are very close. The catalyst according to formula (I) in the present claims is significant in this regard as it effects the desired reaction rate. The interaction of the claimed catalyst and blocking agent with the epoxy cure and isocyanate reaction rates is not disclosed in the cited prior art.

Because the claimed catalyst provides for the desired reaction rates, clear films from the claimed reactive system are obtained. When the reaction rates are mismatched, unreacted polyisocyanate or unreacted epoxy compounds result in undesirable hazy or opaque films. This problem and the solution thereto are not disclosed or suggested in the prior art. For example, films produced according to the teaching of Laumann generally have a turbid appearance. Further, because the epoxy reaction and network development take place simultaneously, excess network development does not occur and the film is not brittle. The unblocked blocking agent is helpful in this regard as it acts as a plasticizer in the resulting film.

There is no disclosure in Tarbutton or JP 50-117771 to use the catalyst according to formula (I) in this way. In fact Tarbutton does not even disclose using the claimed catalyst for the isocyanate reaction, but as a catalyst for the epoxy curing reaction.

Lauman suggests that any suitable curing agent that cures at the same rate be used, but provides no criteria for what that might be. None of the cited prior art references disclose or suggest the claimed blocking agent. Tarbutton or JP 50-117771 disclose a catalyst, but for unrelated reactions. So no solution to the problem of providing similar reaction rates is provided in the cited prior art.

With all due respect, it appears that the Examiner has used the present disclosure as a roadmap and has pieced together prior art references based on that roadmap to provide his *prima facie* case for obviousness. Such an approach is impermissible as it is clearly hindsight.

In order to render a claim obvious, the combined prior art must provide some disclosure, suggestion, or motivation that would lead one skilled in the art to every limitation in the claimed invention.

This is not the case with the cited prior art. There is no disclosure, suggestion, or motivation to use the combination of blocking agents and catalyst as

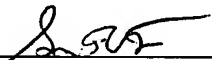
in the presently amended claims. The combination of Lauman, Xiao, Boutillier, Tarbutton and JP 50-117771 does not disclose the present invention and does not provide any motivation for a skilled artisan to arrive at the present invention. As such, the amended claims are not obvious over the cited prior art and the rejection of Claims 13-32 under 35 U.S.C. § 103(a) should be withdrawn.

CONCLUSION

Applicants respectfully request reconsideration of the rejections as the teaching, motivation or suggestion to make the claimed solventless reactive system and the reasonable expectation of success are not found in the applicable combined references.

In view of the above remarks, reconsideration of the rejections and allowance of Claims 13-32 are respectfully requested.

Respectfully submitted,

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